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October 28, 2010 6631-01

Mr. Mark Maldonado
P.O. Box 30007
Santa Barbara, California 93130-0007

Subject: ***Maldonado Assisted Living Facility Project Environmental Noise Study Report***

Dear Mr. Maldonado:

Dudek has completed an Environmental Noise Study in support of site planning and design efforts for a proposed Maldonado Assisted Living Facility project located in the City of Santa Barbara (City), California. In summary, the project would develop an assisted living facility along De La Vina Street. The future traffic noise level would comply with the City's exterior 60 A-weighted decibel (dBA) Community Noise Equivalent Level (CNEL) noise criterion. However, to comply with the City's interior noise standard, an interior noise analysis will be required for Units 201, 202, and 230. These units would require air conditioning or mechanical ventilation system and possibly sound-rated windows to mitigate the interior noise impact. The interior noise study will be required prior to issuance of building permits.

1.0 INTRODUCTION

This report includes a noise evaluation of existing and future noise levels in outdoor living areas and a preliminary interior noise discussion of the proposed residential units for the Maldonado Assisted Living Facility project. This study includes also an evaluation of the potential short-term construction noise impacts upon adjacent land uses.

Data used in our analysis were taken from the project plans (Hochhauser Blatter Architecture and Planning 2010). Traffic volumes used in our analysis are based on data provided by Associated Transportation Engineers. A glossary of acoustical terms and definitions used in this report is included in Attachment A. All noise levels in this report are in terms of A-weighted decibel, dBA.

2.0 NOISE CRITERIA

The Land Use Compatibility Standards in the City of Santa Barbara's Noise Element of the General Plan (City of Santa Barbara 1979), used to evaluate the noise impacts for the project's residential uses are:

- Interior Living areas: 45 dBA CNEL.
- Outdoor Living areas: 60 dBA CNEL.

The 60 CNEL exterior noise exposure level is considered the maximum allowable exterior noise level for the residential outdoor living areas, such as a common outdoor porch.

The City's Noise Ordinance, Chapter 9.16.015, *Construction Work at Night*, includes guidelines applicable to the projects construction. The City's Noise Ordinance, Chapter 9.16.015 stipulates:

> It shall be unlawful for any person, between the hours of 8:00 p.m. of any day and 7:00 a.m. of the following day to erect, construct, demolish, excavate for, alter or repair any building or structure if the noise level created thereby is in excess of the ambient noise level by 5 dBA at the nearest property line of a property used for residential purposes unless a special permit therefore has been applied for and granted.

3.0 PROJECT BACKGROUND AND SETTING

The project site is located on three parcels of land on the northerly side of De La Vina Street, approximately mid-block between Islay Street and Pedregosa Street. The regional location and project vicinity are depicted in Figures 1 and 2.

The project proposes the merging of the present three parcels, demolition of the present two duplexes and one single family home, and the development of a two-story assisted living facility. Figure 3 depicts the site plan for the proposed project.

4.0 EXISTING NOISE ENVIRONMENT

The principal contributor to the ambient noise environment at the project site is traffic noise from De La Vina Street. The De La Vina Street carries a current traffic volume of approximately 11,700 average daily trips (ADT) adjacent to the site (Associated Transportation Engineers). Islay Street and Pedregosa Street are not immediately adjacent to the site and are not anticipated to contribute significantly to the noise environment at the site.

The existing noise environment at the site was monitored on August 8, 2008, between 12:05 p.m. and 12:20 p.m. The noise measurements were taken using a Rion NL 32 integrating sound level meter, with A-weighting and "slow" response settings. This sound level meter meets the current American National Standards Institute standard for a Type 1 precision sound level meter. The sound level meter was calibrated before and after the reading.

The sound level meter was positioned at approximately 30 feet distance from the De La Vina Street centerline (Figure 4) at 5 feet above the front yard level. The noise level monitored for 15 minutes at this location was 63 dBA, which is considered representative for the hourly equivalent daytime noise level at the monitored location.

During the measurement, the principal contributor to the ambient noise environment at the project site was traffic noise from the De La Vina Street. De La Vina Street traffic was observed to move smoothly during the measurement, at an average speed of approximately 25 miles per hour (mph). No other significant noise sources were observed during the measurement. The weather conditions during the measurements were temperature 71°F, 70% relative humidity, partly cloudy sky, and less then 2 mph westerly wind.

5.0 FUTURE VEHICLE NOISE ANALYSIS

De La Vina Street is expected to remain the primary noise source at the project site in the future. Worse case future vehicle noise levels at the site were calculated using a Federal Highway Administration's (FHWA) TNM 2.5 traffic noise prediction model (FHWA 2004). This vehicle noise prediction model was calibrated using the 63 dBA noise level. The difference between the monitored and calibrated noise level is less than 1 dBA, which is well within the accuracy of the noise monitoring and modeling programs.

The following existing and future ADT used in this analysis were provided by Associated Transportation Engineers:

<u>De La Vina Street:</u>

- Existing ADT: 11,700
- Year 2030 ADT: 12,900

Based upon our observations and vehicle count along De La Vina Street, the vehicle mix on De a Vina Street is assumed 99% automobiles, 0.5% medium trucks, and 0.5% heavy trucks/buses. The input into the computer model includes the above existing and future traffic volumes and vehicle mix, with an average vehicle speed of 25 mph along the De La Vina Street. This modeled average vehicle speed correlated well with the results of the noise measurements. The results of the new buildings future exterior noise analysis are summarized in Table 1. A copy of the vehicle noise prediction model calculation sheets is included in Attachment B.

Table 1
Year 2030 Modeled Exterior Noise Levels

Location	Façade – 1st Floor	Façade 2nd Floor
Building Façade Facing De La Vina	60 dBA CNEL	61 dBA CNEL

There would be no outdoor use areas fronting De La Vina Street. Thus, no exterior noise impact would occur. The traffic noise level at the façade of the building facing De La Vina Street would be 60 dBA CNEL at the first floor level and 61 dBA CNEL at the second floor level.

5.1 Future Traffic Noise Analysis Findings

5.1.1 Interior Noise Levels (Preliminary)

The data shown in Table 1 indicate Year 2030 De La Vina traffic noise levels at the facade of the units facing De La Vina Street would range up to 61 dBA CNEL. Standard construction materials and techniques used for new developments in Southern California would result in a minimum exterior to interior noise attenuation of 12 dBA with windows open, and minimum 20 dBA with windows closed. Therefore, the interior noise level for Units 201, 202 and 230 could range up to 49 dBA CNEL with windows open and up to 41 dBA CNEL with windows closed. Consequently, the interior noise levels at Units 201, 202 and 230 (i.e., the units fronting De La Vina Street) could exceed the City of Santa Barbara 45 dB CNEL interior noise level requirement with windows open.

Year 2030 De La Vina Street traffic noise levels at the facades of units not facing De La Vina Street are expected to be at least be 5 dBA lower (i.e., 56 dBA CNEL or less) due to their orientation and greater distances from De La Vina Street. Consequently, the interior noise level at all other units will meet the City of Santa Barbara 45 dB CNEL interior noise level requirement with windows open and closed.

Based on the preliminary interior noise analysis, it is anticipated that, as a minimum mitigation, a closed windows condition will apply to Units 201, 202, and 230. Thus, adequate ventilation (mechanical ventilation and/or air-conditioning) needs to be provided to these spaces. The ventilation system should be designed and constructed to meet the Uniform Building Code minimum ventilation rate requirements.

5.2 Traffic Noise Mitigation

5.2.1 Interior Noise Level

A detailed interior noise analysis must be prepared for Units 201, 202, and 230 at the time of building permit application, when more construction design details are available. This detailed interior noise analysis would verify if the planned new buildings' envelopes would achieve the necessary sound insulation to meet the City of Santa Barbara 45 dB CNEL interior noise level requirement, and/or would provide the recommendations to accomplish this. The recommendations in the detailed interior noise analysis project may include noise mitigation measures such as a windows closed condition, sound insulating doors and windows, and upgrades to exterior walls, roof, and attic-vent openings.

The detailed interior noise analysis may also be used to analyze compliance of the project's interior partitions and floor/ceiling assemblies between residential units with California State sound transmission class (STC) and impact insulation class (IIC) requirements.

6.0 CONSTRUCTION NOISE IMPACT ANALYSIS

Construction noise is a temporary phenomenon. Construction noise levels will vary from hour-to-hour and day-to-day, depending on the equipment in use, the operations being performed, and the distance between the source and receptor. The project's construction potentially impacting the existing noise environment at the site include:

- **Demolition of existing structures**. Sources include dozers, excavators, front loaders, and trucks.
- **Site preparation**. Sources include trucks, backhoes, front-end loaders, and pavers.
- **Construction of foundations**. Sources include concrete trucks and mixers.
- **Facade and interior construction**. Sources include hammering, drilling, generators, compressors, and light truck traffic.
- **Mechanical Equipment systems installation**. Sources include hammering, drilling, generators, compressors, and light truck traffic.

The Environmental Protection Agency (EPA) has compiled data regarding the noise-generating characteristics of specific types of construction equipment. The typical maximum noise levels for various pieces of construction equipment at a distance of 50 feet are presented in Table 2.

Table 2
Construction Equipment Noise Levels

Equipment Type	"Typical" Equipment dBA at 50 feet	"Quiet" Equipment [1] dBA at 50 feet
Backhoe	85	80
Truck, Crane	88	80
Dozer	87	83
Loader	84	80
Pavers	88	80
Pneumatic Tools	85	75
Shovel	82	80
Trucks	88	83

[1] Quieted Equipment: with enclosures, mufflers, or other noise-reducing features.
SOURCE: Environmental Protection Agency (EPA)

Note that the equipment noise levels presented in Table 2 are *maximum* noise levels. The equipment operates in alternating cycles at various power levels, thus, producing variable noise levels, lower than the maximum equipment noise levels. The average sound level of the construction activity also depends upon the amount of time that the equipment operates, and the intensity of the construction during the time period.

The maximum equipment noise levels at 50 feet distance shown in Table 2 decrease with distance from the construction site at a rate of approximately 6 dBA per doubling of distance. The nearest sensitive receptors could be as close as 50 feet distance from the project's nearest construction activities, potentially resulting in maximum noise levels ranging between 82 dBA to 88 dBA for "typical" equipment and between 75 dBA to 83 dBA for "quiet" equipment at these locations.

6.1 Construction Noise Impact Analysis Findings

Although it can be expected that construction of the project could create short-term noise disturbances for residences, and people near the project site, these potential disturbances can be minimized by compliance with the City's Noise Ordinance time limitations for construction, i.e., no construction should take place between the hours of 8:00 p.m. of any day and 7:00 a.m. of the following day.

This concludes our noise assessment. Should you have any questions regarding the above information, please do not hesitate to contact me at mkomula@dudek.com.

Sincerely,

Mike Komula
Senior Acoustician

Att: Figures 1–4
Attachment A, Acoustical Terms and Definitions
Attachment B, Vehicle Noise Calculations

REFERENCES

Associated Transportation Engineers. *De La Vina Street traffic data.*

FHWA (Federal Highway Administration). 2004. *FHWA Traffic Noise Model User's Guide (Version 2.5 Addendum).* April.

Santa Barbara, City of. 1979. *City of Santa Barbara General Plan Noise Element.* August.

Santa Barbara, City of. 1997. *City of Santa Barbara Noise Ordinance.* Rev. December 31.

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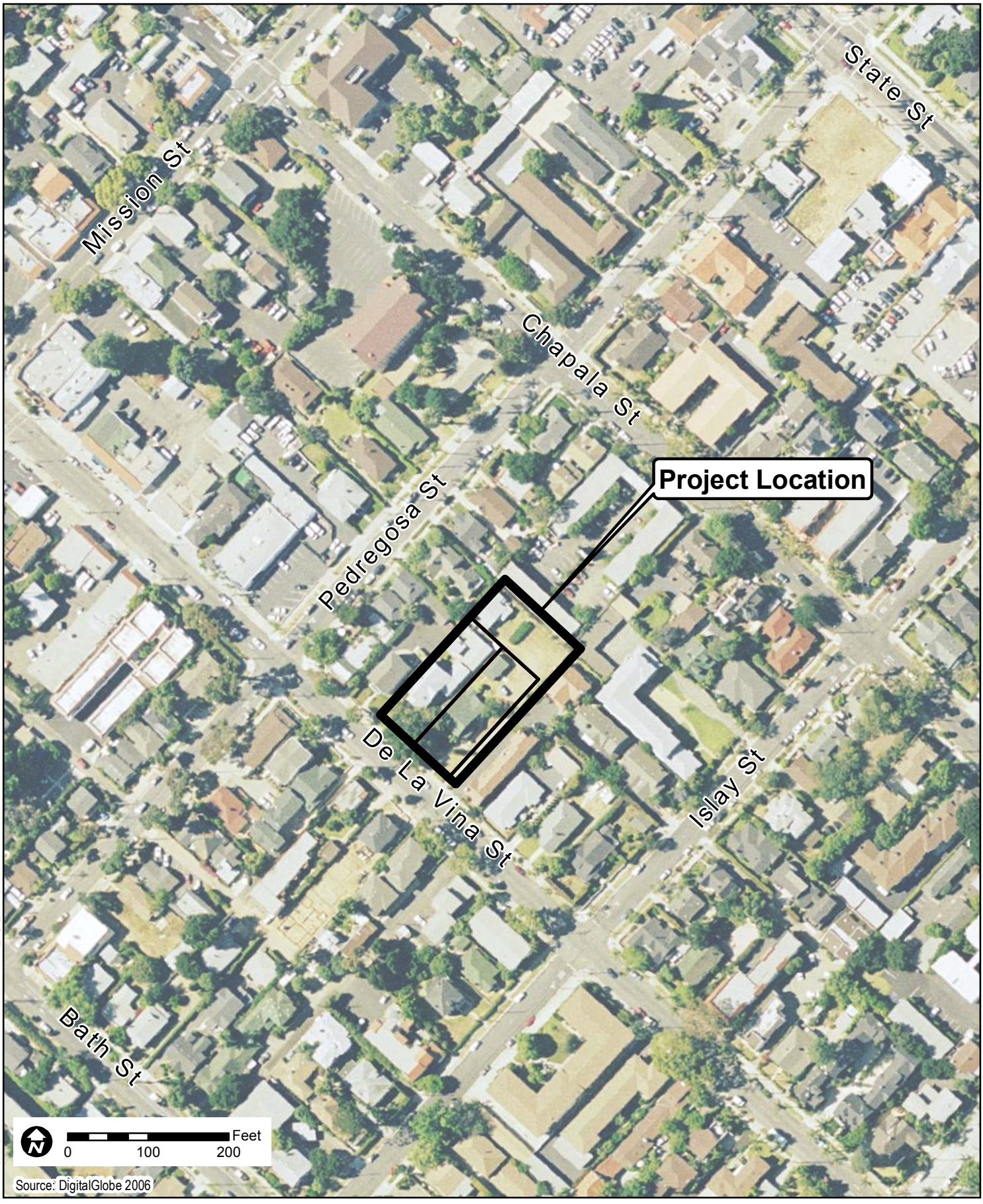
Maldonado Assisted Living Facility - Environmental Noise Study

Regional Setting

FIGURE 1



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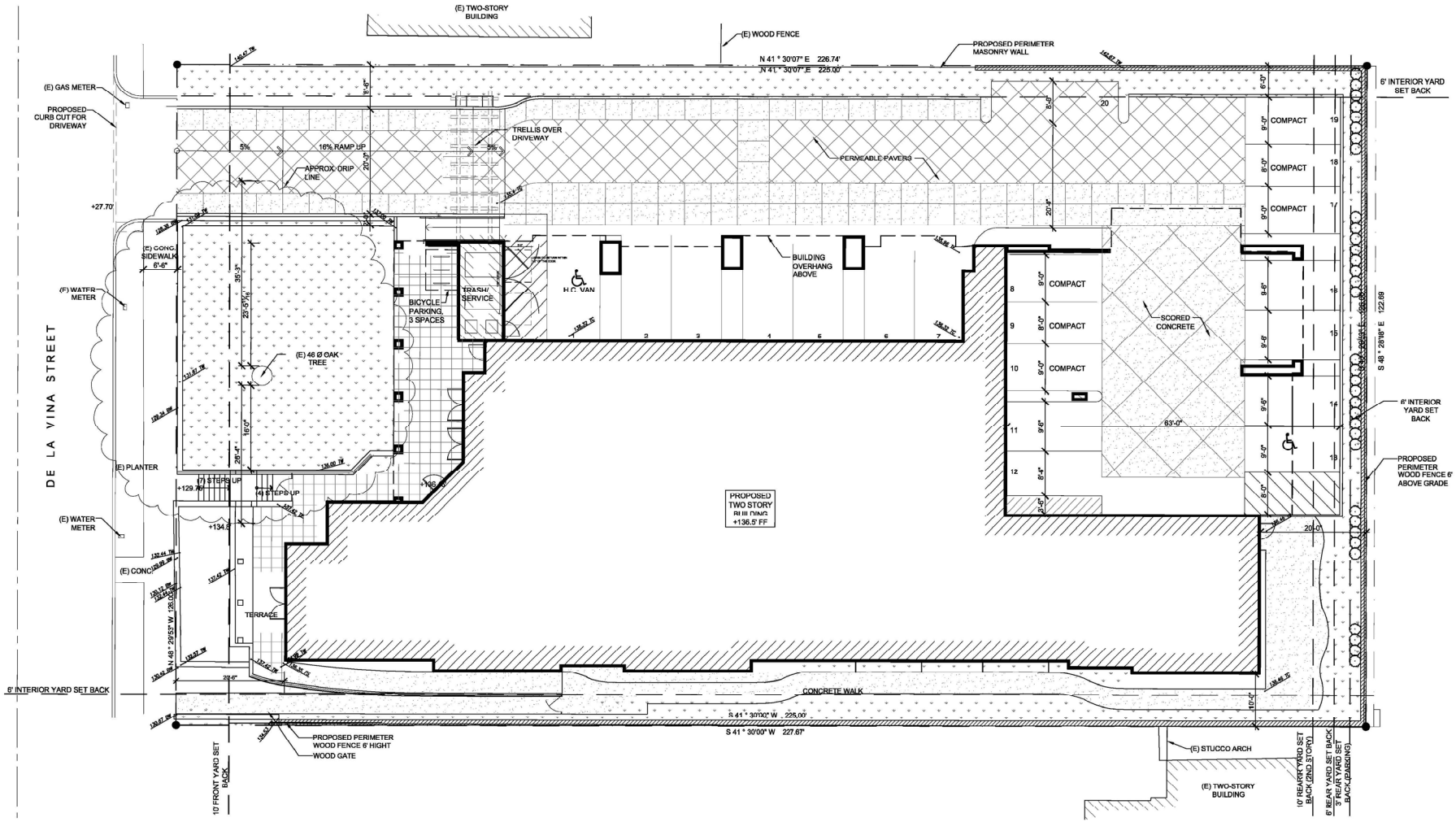
Maldonado Assisted Living Facility - Environmental Noise Study

Project Vicinity Map

FIGURE 2



Feet
0 15 30

Source: Hochhauser Blatter October 26, 2010.

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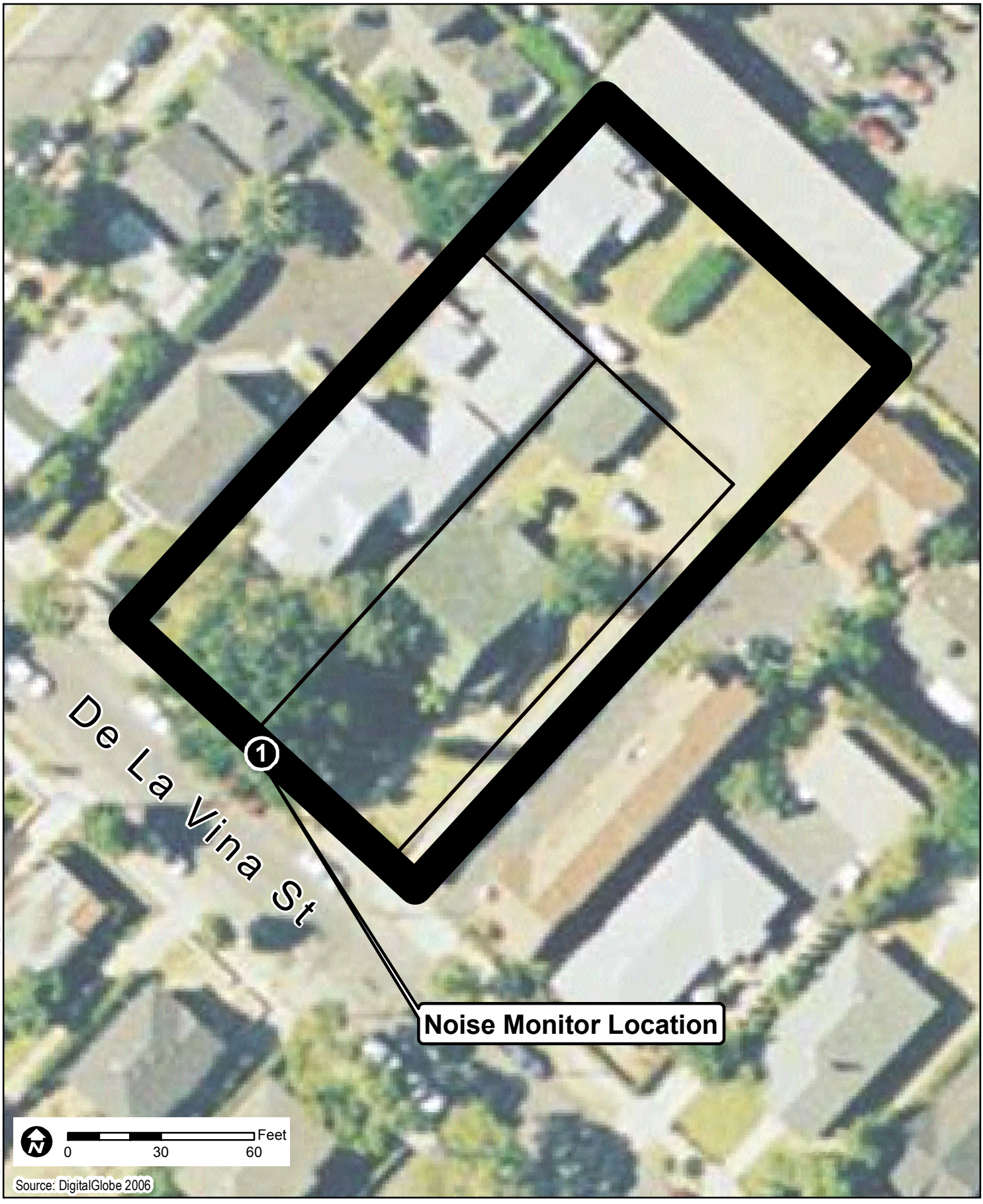
Maldonado Assisted Living Facility - Environmental Noise Study

Site Plan

FIGURE 3



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Maldonado Assisted Living Facility - Environmental Noise Study

Noise Monitor Location

FIGURE 4

ATTACHMENT A

Acoustical Terms and Definitions

ATTACHMENT A
Acoustical Terms and Definitions

Term	Definition
Ambient Noise Level:	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
A-Weighted Sound Level (dBA):	The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Community Noise Equivalent Level (CNEL):	The A-weighted equivalent continuous sound exposure level for a 24-hour period with a 10 dB adjustment added to sound levels occurring during nighttime hours (10:00 p.m. to 7:00 a.m.) and a 5 dB adjustment added to the sound levels occurring during the evening hours (7:00 p.m. to 10:00 p.m.).
Day/Night Noise Equivalent Level (Ldn):	The A-weighted equivalent continuous sound exposure level for a 24-hour period with a ten dB adjustment added to sound levels occurring during nighttime hours (10:00 p.m. to 7:00 a.m.).
Decibel (dB):	Unit for measuring sound pressure level, equal to 10 times the logarithm to the base 10 of the ratio of the measured sound pressure squared to a reference pressure, which is 20 micro-Pascal.
Time-Average Sound Level (TAV):	Sound level corresponding to a steady state sound level and containing the same total energy as a time varying signal over a given sample period. TAV is designed to average all of the loud and quiet sound levels occurring over a specific time period.

ATTACHMENT B

Vehicle Noise Calculations

dudek **28 April 2010**

mk **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes

PROJECT/CONTRACT: **Maldonado Assisted Living Facility**

RUN: **Mitigated**

Roadway	Points		Segment									
Name	Name	No.	Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Roadway1	point1	1	639	25	3	25	3	25	0	0	0	0
	point2	2										
Roadway2	point3	3	639	25	3	25	3	25	0	0	0	0
	point4	4										

dudek 28 April 2010
mk TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: Maldonado Assisted Living Facility
RUN: Mitigated

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria: Existing LAeq1h	Impact Criteria LAeq1h	Impact Criteria Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Front Porch	1	1	0.0	50.0	3.00	4.92	0.00	66	10.0	8.0	Y
Front Facade-2nd Floor	2	1	0.0	60.0	13.00	4.92	0.00	66	10.0	8.0	Y

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mk TNM 2.5

INPUT: BARRIERS
PROJECT/CONTRACT: Maldonado Assisted Living Facility
RUN: Mitigated

Barrier									Points										
Name	Type	Height		If Wall	If Berm			Add'tnl	Name	No.	Coordinates (bottom)			Height	Segment				
		Min	Max	$ per	$ per	Top	Run:Rise	$ per			X	Y	Z	at	Seg Ht Perturbs			On	Important
				Unit	Unit	Width		Unit						Point	Incre-	#Up	#Dn	Struct?	Reflec-
				Area	Vol.			Length							ment				tions?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier1	W	0.00	99.99	0.00				0.00	point1	1	-15.0	60.0	3.00	5.00	0.00	0	0		
									point2	2	-15.0	40.0	3.00	5.00	0.00	0	0		
									point3	3	15.0	40.0	3.00	5.00	0.00	0	0		
									point4	4	15.0	60.0	3.00	5.00					

dudek
mk
28 April 2010
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Maldonado Assisted Living Facility
RUN: Mitigated
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	With Barrier Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Front Porch	1	1	0.0	56.0	66	56.0	10	----	56.0	0.0	8	-8.0
Front Facade-2nd Floor	2	1	0.0	60.7	66	60.7	10	----	60.7	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	2	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

dudek 28 April 2010
mk TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: Maldonado Assisted Living Facility
RUN: Mitigated

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Roadway1	12.0	point1	1	-1,000.0	6.0	0.00				Average	
		point2	2	1,000.0	6.0	0.00					
Roadway2	12.0	point3	3	-1,000.0	-6.0	0.00				Average	
		point4	4	1,000.0	-6.0	0.00					